

3.8 Noise

3.8.1 Affected Environment

The Intertie is located within the boundary of Alameda County. The following discussion provides background information on noise terminology and describes the existing environment in terms of sensitive receptors, existing noise levels, and regulatory requirements.

Noise Terminology

Following are brief definitions of acoustic and vibration terminology used in this chapter:

- **Sound.** A vibratory disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Decibel (dB).** A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Maximum Sound Level (L_{\max}).** The maximum sound level measured during the measurement period.
- **Minimum Sound Level (L_{\min}).** The minimum sound level measured during the measurement period.
- **Equivalent Sound Level (L_{eq}).** The equivalent steady state sound level that in a stated period of time would contain the same acoustical energy.
- **Percentile-Exceeded Sound Level (L_{xx}).** The sound level exceeded “x” percent of a specific time period. L_{10} is the sound level exceeded 10% of the time.
- **Day-Night Level (L_{dn}).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.
- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period with 5 dB added to the A-weighted sound levels occurring during the period from 7:00 p.m. to 10:00 p.m. and 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.

- **Peak Particle Velocity (PPV).** The maximum velocity of a particle in vibrating medium such as soil. PPV is usually expressed in inches/sec.

L_{dn} and CNEL values rarely differ by more than 1 dB. As a matter of practice, L_{dn} and CNEL values are considered to be equivalent and are treated as such in this assessment. In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level.

Noise-Sensitive Receptors

Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Noise-sensitive land uses typically include residences, hospitals, schools, guest lodging, libraries, and certain types of recreational uses.

The project area is primarily rural agricultural land with low-to-moderate density residential development. The closest residence is at least 2,000 feet away from the site of the Proposed Action.

Existing Noise Environment

The existing noise environment in the project area is governed primarily by vehicular traffic along Interstates 205 and 580 and other roadways, and occasional aircraft flying over. Table 3.8-1 shows typical noise levels in rural, suburban, and urban environments. These noise levels can be used to generally characterize noise conditions in the project area.

Table 3.8-1. Population Density and Associated Ambient Noise Levels

Location	L_{dn} (dBA)
Rural	
Undeveloped	35
Partially developed	40
Suburban	
Quiet	45
Normal	50
Urban	
Normal	55
Noisy	60
Very noisy	65

Regulatory Setting

California requires each local government entity to implement a noise element as part of its general plan. California Administrative Code, Title 4, has guidelines for evaluating the compatibility of various land uses as a function of community noise exposure. The State land use compatibility guidelines are listed in Table 3.8-2.

Table 3.8-2. State Land Use Compatibility Standards for Community Noise Environment

Land Use Category		Community Noise Exposure— L_{dn} or CNEL (db)							
		50	55	60	65	70	75	80	
Residential—Low Density Single Family, Duplex, Mobile Homes									
Residential—Multi-Family									
Transient Lodging—Motels, Hotels									
Schools, Libraries, Churches, Hospitals, Nursing Homes									
Auditoriums, Concert Halls, Amphitheaters									
Sports Arenas, Outdoor Spectator Sports									
Playgrounds, Neighborhood Parks									
Golf Courses, Riding Stables, Water Recreation, Cemeteries									
Office Buildings, Business Commercial and Professional									
Industrial, Manufacturing, Utilities, Agriculture									
	Normally Acceptable	Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.							
	Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.							
	Normally Unacceptable	New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.							
	Clearly Unacceptable	New construction or development generally should not be undertaken.							

Source: California Governor's Office of Planning and Research 1998.

The Proposed Action lies within Alameda County. Alameda County has established policies and regulations concerning the generation and control of noise that could adversely affect their citizens and noise-sensitive land uses. The General Plan is a document required by State law that serves as the jurisdiction's blueprint for land use and development. The plan is a comprehensive, long-term document that provides details for the physical development of the jurisdiction, sets policies, and identifies ways to put the policies into action. The General Plan provides an overall framework for development in the jurisdiction and protection of its natural and cultural resources. The Noise Element of the General Plan (Alameda County Community Development Agency 1994) contains planning guidelines relating to noise. The noise element identifies goals and policies to support achievement of those goals. The goals and policies contained in the general plan are applicable throughout the jurisdiction. The following is a brief discussion of the General Plan policies and noise ordinance regulations in the project area to protect its citizens from the adverse of noise.

County of Alameda General Plan Policies

The Alameda County adopted its General Plan in 1975 and amended it on May 5, 1994. The general plan does not explicitly establish noise level performance standards and does not specify noise compatibility guidelines.

County of Alameda County Code

Alameda County's noise ordinance establishes noise standards for areas within the unincorporated county (Tables 3.8-3 and 3.8-4). Construction activities that occur between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday, and between 8:00 a.m. and 5:00 p.m. Saturday and Sunday are exempt from the county's noise ordinance. In addition, construction and maintenance and repair operations conducted by public agencies and/or utility companies or their contractors that are deemed necessary to serve the best interests of the public are exempt from the county's noise ordinance.

Table 3.8-3. Alameda County Code Exterior Noise Level Standards¹

Category	Cumulative Number of Minutes Allowable in Any 1-Hour Time Period	Daytime Limit (dBA) (7:00 a.m.–10:00 p.m.)	Nighttime Limit (dBA) (10:00 p.m.–7:00 a.m.)
1	30	50	45
2	15	55	50
3	5	60	55
4	1	65	60
5	0	70	65

¹ For residential, school, hospital, church, or public library land uses.

Table 3.8-4. Alameda County Code Exterior Noise Level Standards for Commercial Properties

Category	Cumulative Number of Minutes Allowable in Any 1-Hour Time Period	Daytime Limit (dBA) (7:00 a.m.–10:00 p.m.)	Nighttime Limit (dBA) (10:00 p.m.–7:00 a.m.)
1	30	65	60
2	15	70	65
3	5	75	70
4	1	80	75
5	0	80	80

Other Relevant Criteria

There are no commonly accepted thresholds for acceptable levels of noise from construction activities. The Office of Noise Control (ONC) of the California Department of Health published a model noise ordinance 1977 (Office of Noise Control 1977). This model ordinance provides recommended limits on noise generated by construction noise sources. These limits are summarized in Table 3.8-5.

Table 3.8-5. Office of Noise Control Construction Noise Limits

Time of Day	Single Family Residential		Multi-Family Residential		Semi-Residential/Commercial	
	Duration <10 days	Duration ≥10 days	Duration <10 days	Duration ≥10 days	Duration <10 days	Duration ≥10 days
Daily, except Sundays and legal holidays, 7 a.m. to 7 p.m.	75 dBA	60 dBA	80 dBA	65 dBA	85 dBA	70 dBA
Daily, 7 p.m. to 7 a.m. and all day Sunday and legal holidays	60 dBA	50 dBA	65 dBA	55 dBA	70 dBA	60 dBA

Source: Office of Noise Control 1977

3.8.2 Approach

Methodology

The assessment of potential construction noise impacts was conducted using methodology developed by the Federal Transit Administration (FTA) (Federal Transit Administration 1995). Specific assumptions used are discussed under each impact.

Significance Criteria

Appendix G of the State CEQA Guidelines, the Alameda County Noise Elements and noise ordinances, and standard professional practice were used to determine whether the Proposed Action would have a significant environmental effect. Based on Appendix G, the following thresholds of significance were used in this analysis.

Would the project:

- expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies;
- expose persons to or generate excessive groundborne vibration or groundborne noise levels;
- result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- be located within an airport land use plan area, or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport and expose people residing or working in the project area to excessive noise levels; or
- be located in the vicinity of a private airstrip and expose people residing or working in the project area to excessive noise levels.

Based on Alameda County General Plan noise guidelines above and the other relevant standards discussed above, the following thresholds of significance have been developed for this project. Noise resulting from a project alternative is considered significant if:

- construction noise would exceed Alameda County noise ordinance criteria during applicable hours (7:00 p.m. to 7:00 a.m. Monday through Friday and 5:00 p.m. to 8:00 a.m. Saturday and Sunday);

- construction noise would exceed 75 dBA at noise sensitive uses during hours when the Alameda County noise ordinance is not applicable (i.e., areas outside of unincorporated Alameda County); or
- operational noise would exceed 50 dBA L_{eq} between the hours of 7:00 a.m. and 10:00 p.m., or 45 dBA L_{eq} between the hours of 10:00 p.m. and 7:00 a.m.

3.8.3 Environmental Consequences

No Action Alternative

Under the No Action Alternative, expected and potential noise sources would continue as at present. There would be no impact on noise, and existing conditions as described above would remain.

Proposed Action Alternative

Impact NZ-1: Exposure of Noise-Sensitive Land Uses to Noise from General Construction Activities

A list of construction equipment that will likely be used to construct this alternative was provided by the project engineers. Table 3.8-6 summarizes this equipment along with typical noise levels produced by this equipment.

Table 3.8-6. Construction Equipment Inventory and Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 feet from Source
Backhoe	80
Crane, Derrick	88
Dozer	85
Excavator/Shovel	82
Grader	85
Loader	85
Paver	89
Roller/Sheep's Foot	74
Scraper	89
Truck	88
Source: Federal Transit Administration 1995	

Noise levels presented in Table 3.8-6 were used in this analysis to estimate construction noise. The magnitude of construction noise impacts depends on the type of construction activity, the noise level generated by various pieces of

construction equipment, the duration of the activity, the distance between the activity and noise-sensitive receivers, and any shielding effects that might result from intervening barriers, including topography.

A reasonable worst-case assumption is that the three loudest pieces of equipment would operate simultaneously and continuously over at least a 1-hour period for a combined source noise level. Based on the noise levels summarized in Table 3.8-6, Table 3.8-7 calculates estimated sound levels from construction activities as a function of distance. Simultaneous operation of a paver, scraper, and truck for a combined source level of 93 dBA at 50 feet is assumed. Point-source attenuation of 6 dB per doubling of distance, as well as molecular absorption of 0.7 dB per 1,000 feet and anomalous excess attenuation of 1 dB per 1,000 feet, are also assumed based on guidance in Hoover and Keith 1996.

Table 3.8-7. Estimated Construction Noise in the Vicinity of an Active Construction Site as a Function of Distance

Distance Attenuation	
Distance to Receptor (feet)	Sound Level at Receptor (dBA)
50	93
100	87
200	81
400	74
500	72
800	68
1,000	65
1,500	61
2,000	58
2,500	55
3,000	52
4,000	48
5,280	44

The following assumptions were used:

Basic sound level drop-off rate: 6.0 dB per doubling of distance

Molecular absorption coefficient: 0.7 dB per 1,000 feet

Anomalous excess attenuation: 1.0 dB per 1,000 feet

Reference sound level: 93 dBA

Distance for reference sound level: 50 Feet

Notes: This calculation does not include the effects, if any, of local shielding, which may reduce sound levels further.

Estimates are based on Jones & Stokes' calculations for a paver, scraper, and truck using methods described in Hoover and Keith 1996.

The results in Table 3.8-7 indicate that the threshold of 75 dBA during hours when the noise ordinance is not applicable could be exceeded within about 400 feet of construction activities. However no noise-sensitive land uses are within

2,000 feet of proposed construction. The Alameda County noise criteria of 50 dBA for hours between 7:00 p.m. and 10:00 p.m. Monday through Friday and 5:00 p.m. and 10:00 p.m. Saturday and Sunday would be exceeded within about 3,500 feet. The criteria of 45 dBA for hours between 10:00 p.m. and 7:00 a.m. would be exceeded within about 5,000 feet of proposed construction. There are two residences within 3,500 feet of proposed construction. Construction noise impacts are therefore potentially significant for construction activity occurring between the hours of 7:00 p.m. and 7:00 a.m.

To reduce the potential of construction noise impacts, the construction contractor will employ noise-reducing construction practices between the hours of 7:00 p.m. through 7:00 a.m. on Monday through Friday and 5:00 p.m. through 8:00 a.m. on Saturday and Sunday such that the noise from construction does not exceed the applicable noise criteria in the Alameda County noise ordinance as described in Table 3.8-3.

Measures that can be used to limit noise may include but not limited to:

- limiting hours of construction operation,
- locating equipment as far as practical from noise-sensitive uses,
- using sound control devices such as mufflers on equipment,
- using equipment that is quieter than standard equipment,
- selecting haul routes that affect the fewest number of people,
- using noise-reducing enclosures around noise-generating equipment,
- constructing barriers between noise sources and noise-sensitive land uses or taking advantage of existing barrier features (terrain, structures) to block sound transmission, and
- temporarily relocating residents (i.e., providing hotel vouchers) during periods of high construction noise that cannot be effectively reduced by other means.

Impact NZ-2: Exposure of Noise-Sensitive Land Uses to Noise from Pump Operating Noise

Data provided by the project engineers indicate that pumps will be used for operation of the project. The pumps used will be electric-powered, and the horsepower is anticipated to be 500 horsepower (HP). It is anticipated that up to eight pumps may be used.

Noise levels from operation of pumps were calculated based on information provided by the project engineers, methodology developed by the FTA, and methodology developed by Hoover and Keith (Hoover and Keith 1996). As stated above, data provided by the project engineers indicate that up to eight pumps may be used. A reasonable worst-case assumption is that eight pumps

would operate simultaneously and continuously over at least a 1-hour period. A single 500-HP electric pump is estimated to result in a noise level of 94 dBA at 3 feet (Hoover and Keith 1996). This corresponds to a sound level of 70 dBA at 50 feet. The operation of 8 pumps would add 9 dB to this, resulting in a combined noise level of 79 dBA at 50 feet. Table 3.8-8 calculates estimated sound levels from the operation of pumps as a function of distance. Point-source attenuation of 6 dB per doubling of distance, as well as molecular absorption of 0.7 dB per 1,000 feet and anomalous excess attenuation of 1 dB per 1,000 feet, are also assumed (Hoover and Keith 1996).

Table 3.8-8. Estimated Operating Pump Noise Levels as a Function of Distance

Distance Attenuation	
Distance to Receptor (feet)	Sound Level at Receptor (dBA)
50	79
100	73
200	67
400	58
500	56
800	54
1,000	51
1,500	47
2,000	44
2,500	41
3,000	38

The following assumptions were used:

Basic sound level drop-off rate: 6.0 dB per doubling of distance
Molecular absorption coefficient: 0.7 dB per 1,000 feet
Anomalous excess attenuation: 1.0 dB per 1,000 feet
Reference sound level: 79 dBA
Distance for reference sound level: 50 Feet

Notes: This calculation does not include the effects, if any, of local shielding, which may reduce sound levels further.

Estimates are based on Jones & Stokes' calculations for the simultaneous operation of 8 pumps.

The results in Table 3.8-8 indicate that the daytime threshold of 50 dBA could be exceeded at noise-sensitive land uses within about 1,100 feet, and the 45 dBA nighttime threshold could be exceeded at noise-sensitive land uses within about 1,800 feet. It should be noted that the system pumps would be enclosed in a pump station building, which would provide additional noise attenuation to further reduce pump noise. As indicated above, there are no sensitive receptors

located within 2,000 feet of components of the Proposed Action. Therefore, this impact is considered less than significant and no mitigation is required.

3.8.4 Cumulative Impacts

Neither the Proposed Action nor the No Action Alternative would have any growth-inducing impacts. Consequently, neither would have any cumulative noise impacts attributable to noise from increased population growth. In addition, construction-related noise impacts would be short-term and would cease once construction is complete. Therefore, construction-related noise impacts will not result in any cumulative noise impacts.

